CONGENITAL CERVICAL CYSTS AND FISTULAE*

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Congenital cysts and fistulae of the neck are reported in sizable numbers from large surgical centres. Most surgeons and general practitioners see such cases but rarely.

* An invitation lecture delivered at the Surgical Forum of Prof. D. J. du Plessis at the Medical School, Johannesburg.

The object of this paper is to present a personal series of 48 cases seen in private practice between 1941 and 1960.

Material: Branchial maldevelopments 21, thyroglossal anomalies 27, total 48. Branchial or visceral arch maldevelopments comprised:

(*A*) Pre-auricular fistulae, 4 cases, all of which required operation; and

(*B*) branchial anomalies. These include:

(*a*) Branchial fistulae, 1st cleft, 2 cases of which 1 was operated on; and 2nd cleft, 8 cases, in which the fistula was symmetrical and bilateral in 3. Thus 11 fistulae required operation. Three cases were not operated on.

(*b*) Branchial cysts, 4 cases were operated on.

Aetiology

A. *Pre-auricular sinuses* are present at birth. They may become fistulae if infection of the track occurs and an abscess bursts. They are not actually of branchial origin, but result from failure of perfect coalescence between 2 of the 6 tubercles which develop around the posterior end of the first branchial cleft and form the pinna or auricle (Fig. 1). Tubercle 1 forms the tragus, 2 the crus helicis, 3 the helix, 4 the anti-helix, 5 the anti-tragus, and 6 the lobule.

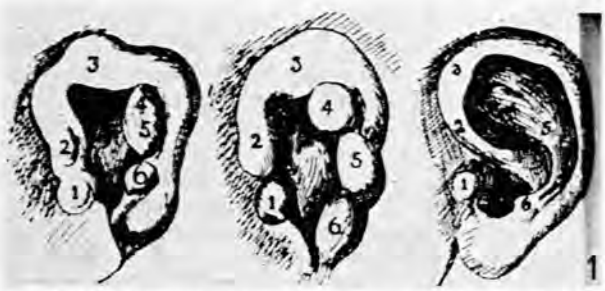


Fig. 1. Development of auricle. The six tubercles are shown. The usual type of pre-auricular fistula is due to a faulty fusion of tubercles 1 and 2. (Re-drawn from Prentiss and Dreg.) From 'Synopsis of surgical anatomy' by courtesy of John Wright and Sons, Bristol.

This anomaly almost always affects the union between tubercles 1 and 2 and thus opens between the tragus and crus helicis or on this crus (Fig. 2).

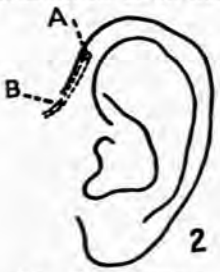


Fig. 2. Schematic representation of a pre-auricular fistula; A=fistula, B=track of fistula. From 'Synopsis of surgical anatomy' by courtesy of John Wright and Sons, Bristol.

The 4 patients in the series comprised 2 females aged 8 and 20, and 2 males aged 18 and 43.

In both females there had been a series of abscesses over a period of 3 years. In the males symptoms had existed for a few months only.

Clinically these sinuses are usually very small. They resemble a tiny pigmented spot. They are frequently unobtrusive and overlooked. I once visited the home of a colleague whom I had not seen for 15 years. He questioned the value of describing rarities like pre-auricular fistulae about which I had written and which the general practitioner never sees. Just then the doctor's son, aged 12, entered the room and his pre-auricular fistula was obvious.

Such sinuses have an hereditary tendency and illustrate the law that congenital anomalies are often multiple. The older of the two girls reported here has a sister, aged 23, with bilateral pre-auricular fistulae which have never caused trouble.

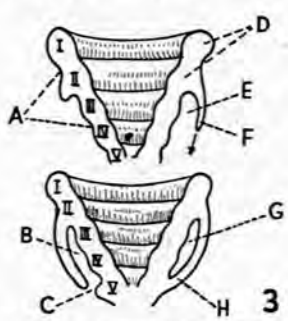
There may be associated cleft palate or harelip, and one of the cases in this series was associated with a thyroglossal cyst. In most cases the sinus causes no trouble and the possessor may be unaware of it. The sinus is lined by stratified squamous epithelium. The track passes downwards and forwards. When infection supervenes the condition presents as a fistula, which opens in front of the tragus, or there may be a red swelling due to an abscess. It is exactly in the position of the pre-auricular gland for which it may be mistaken. The abscess bursts, heals, bursts again, and so on.

Treatment is only necessary if the track is infected. It entails excision of the track and the abscess cavity. The lower part of the excised track may be slow in healing because of the presence of infection.

This operation is not a very satisfactory procedure. Excision cannot be deep over the parotid because of the local anatomy. Cells are displaced by the pathological changes so that late recurrence is common. Two of the cases now reported have recurred within a year of operation.

The writer has seen no instance illustrating the statement that the fistulous track may take a complicated course traversing the parotid and opening in the neck. These are probably instances of the much rarer condition of fistula of the first visceral cleft.

B. *Branchial anomalies*. The developmental origin of branchial fistulae and cysts has been the subject of much discussion, and final agreement has not yet been reached (Fig. 3). Briefly, the neck and pharynx are formed from 5



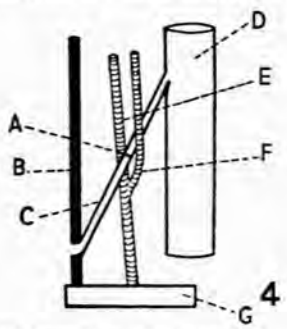


Fig. 3. Figure illustrating method of formation of a branchial cyst and branchial fistula; A=visceral clefts, B=cervical sinus, C=failure of fusion of second arch, causing branchial fistula. D=visceral arches, E=cervical sinus, F=downgrowth of second arch, G=branchial cyst, H=fusion of second arch with skin of neck. From 'Synopsis of surgical anatomy' by courtesy of John Wright and Sons, Bristol.

Fig. 4. Course of a branchial fistula; A=cleft membrane, B=skin, C=fistulous track, D=pharynx, E=internal carotid, F=external carotid.

branchial or visceral arches, as Frazer preferred to call them. Each arch has a muscle mass, a plate of cartilage, a nerve, and an artery. Between the bars are depressions—the branchial clefts externally, lined by squamous epithelium, and the branchial pouches internally, lined by ciliated columnar epithelium. They are separated by the cleft membrane. Developmentally there is never a complete canal from without inwards. If the cleft membrane is absent it is because it is destroyed, e.g. by inflammation or by surgical interference. According to His the second arch grows more

rapidly than successive arches, and comes to overhang them. Thus the pre-cervical sinus is formed. Ultimately it fuses with the fifth. Should fusion be imperfect, a branchial fistula results. Normally the pre-cervical sinus becomes first a buried space and then disappears entirely. If the space persists, a branchial cyst results.

In 1926 Frazer produced evidence to show that the pre-cervical sinus was obliterated from its depths and not by the overhanging of the second arch. During this process a groove exists into the top end of which the second branchial cleft opens, the third and fourth clefts opening into the lower end. Thus, according to Frazer, the situation of the external opening of a branchial fistula at birth, at the anterior border of the sternomastoid, gives no indication of its cleft origin.

The course of the fistula. From its opening just above the sternoclavicular joint at the anterior border of the sternomastoid, the fistulous track passes subcutaneously to the level of the upper border of the thyroid cartilage, where it pierces the deep fascia. It then dips beneath the posterior belly of the digastric and stylohyoid, crosses the hypoglossal nerve and the internal jugular vein, and traverses the fork formed by the bifurcation of the common carotid, the internal carotid being behind and the external in front. The track then lies on the middle constrictor of the pharynx, crossing the glossopharyngeal nerve and the stylopharyngeus muscle, to pierce the superior constrictor and terminate on the posterior pillar of the fauces behind the tonsil (Fig. 4). It does not end in the intra-tonsillar cleft (supra-tonsillar fossa).

Wilson[1] states that the fistulous track receives an investment of muscle from the platysma below and the stylopharyngeus above. If the latter is well developed the external orifice of the fistula will pucker on swallowing. This was demonstrable in 2 patients in this series.

The track is lined by squamous epithelium posterior to the cleft membrane, and by ciliated columnar epithelium in its anterior entodermal portion.

Anomalies of the second cleft may occur as (so-called) complete fistulae, or portions only of the track may persist. Thus there occur sinuses with an external opening and extending inwards only for short distances. If the deeper part only persists, a cyst results. It is probable that entodermal pouches, opening into some part of the pharynx, are more common than is currently thought. If they accumulate secretions or foodstuff, they may cause symptoms such as the periodic discharge of purulent material. Doubtless some are not suspected.

Clinical Features

Fistulae are bilateral and symmetrical in about a third of the cases. There is both a hereditary and a familial tendency. A brother and sister are included in this series. In another case the mother of a girl of 10 with bilateral fistulae, had herself had an opening above the sternoclavicular joint since birth. Exploration showed that the track was only an inch long. A similar case occurs in this series in a boy aged 5 years.

The complaint is of an annoying, clear, or yellowish discharge. Occasionally a swelling forms just proximal to the opening, which might show a mild local inflammation that subsides when the collection is discharged. The external opening in all the cases here reported was extremely small—about the size of a pin head. It is different in colour to the surrounding skin and within an inch of the sternoclavicular joint near the lower end of one or both of the 'bonnet strings' formed by the sternomastoid muscles.

This series comprises 11 patients with second cleft fistulae. Seven were males and 4 females. The ages varied from 3 to 22 years, the average age being 10·9 years. Three of the cases were bilateral and symmetrical, the external openings being tiny and just above the sterno-clavicular joint. Three patients, all females, refused operation.

Surgery

The only treatment is total extirpation. Several practices are referred to merely to be condemned: Nothing should be injected into the fistula—neither sclerosing solutions as a method of treatment, nor contrast media for radiography. Sclerosing solutions are worthless and the use of contrast media unnecessary, and both may convert a clean track into an infected one. These tracks are surprisingly thick-walled structures, with considerable tensile strength, which can be followed throughout their course by the surgeon.

The injection of methylene blue to delineate the track merely confuses the surgeon, because before long, not only the track, but also all the surrounding tissues share in the cerulean obscurity. The sooner an operation is performed, once teething is complete (i.e. after 2), the better. This avoids difficulties which might be caused by obscuration of fascial planes due to attacks of lymphadenitis, etc.

The exposure is by a 2-tier incision in the line of the neck creases, as pointed out by Hamilton Bailey. The lower incision enables the fistulous opening to be mobilized and the track to be exposed (where it is freed from platysma and subcutaneous fat) up to the level of the upper border of the thyroid cartilage, by retracting the top flap. The second incision is at the level of the hyoid bone. It is deepened through deep fascia and the posterior belly of the digastric is exposed. The track is now brought into this incision by freeing it from the lower flap. It may be crossed by the common facial vein which is secured between ligatures. By retraction of the digastric, the carotids are exposed as is the hypoglossal nerve.

It is unnecessary to do a great deal of dissection because the relationship of the track to the structures mentioned is not intimate. The track is a strong tube when the fistula is complete. When the sinus is short the vestige is much more tenuous. The anaesthetist pushes the tonsil outwards with his forefinger, while the surgeon makes gentle sustained traction on the vestige, pushing surrounding structures off the track with the handle of the knife. The side of the pharynx comes to meet him, so to speak. Using this technique, it is then possible to transfix the track at the superior constrictor and stylopharyngeus with a thread of catgut on a 'tickey'-sized needle and to tie it off and remove it. In one case the track came away at its pharyngeal attachment before experience of the manoeuvre had been acquired. This was of no consequence in the convalescence of the patient.

The deep fascia is sutured in the upper incision with catgut. No drainage is used. Clips are removed in 48 hours, and the patient goes home within the week. If the fistula is bilateral the second side is done in the ensuing school holiday. There have been no complications (Fig. 5). These cases have been

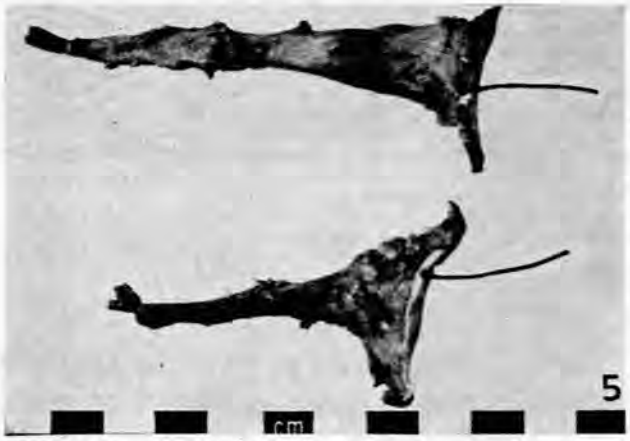


Fig. 5. Bilateral second cleft fistulous tracks.

treated over a period of 17 years, 2 of them within the last year. If the fistula has been removed *in toto* the patient is cured. The transverse scars are usually inconspicuous.

Branchial Cysts

In large series of branchial remnants, such as those quoted later, branchial cysts are found much more commonly than fistulae—i.e. in the proportion of 3 : 1.

In this small series there were 4 cysts. The diagnosis can only be verified by the operative findings and histology. The cyst is due to persistence of some buried part of a branchial cleft or visceral pouch. There is no communication with or attachment to skin. Cases have been described where cysts of entodermal branchial origin have been in communication with the pharynx, the opening having become shut off. Cysts of ectodermal origin (vastly commoner) are lined by squamous epithelium, while entodermal cysts have a columnar epithelial lining. The 4 cases reported here belonged to the former and commoner group. Lymphoid tissue is found in the wall of the cyst. The contents are clear and contain cholesterin crystals which may impart a shimmer to the fluid.

The great majority of these cysts are of second branchial-cleft origin. If the cyst extends inwards it will lie between the carotids. If it lies posterior to internal and/or common carotid it takes origin from the third cleft, since the internal carotid, being the artery of the third branchial arch, lies anterior to the 3rd cleft. One such case occurred in this series. This was a man aged 54 who presented in 1946 with a coconut-sized mass under the upper left sternomastoid. He had known of a small mass there for over 20 years. A year previously it had begun to enlarge rapidly. The mass was elastic in consistency and thought to be a degenerating neoplasm. At operation the tumour was found to extend up to the base of the skull between the arch of the atlas and behind the great vessels. During the removal the vagus nerve was found to be densely adherent to the mass. Convalescence was uneventful. Histologically it was found to be a branchial cyst.

Unlike fistulae, branchial cysts usually appear in adult life, often in the third decade. Bilaterality is rare.

Clinically the diagnosis is presumptive, since breaking-down glands or tuberculous abscesses are much more common. The cyst is under the sternomastoid, about its middle and often behind the angle of the jaw in the area of the tonsillar gland. The mass may feel cystic or solid. Sometimes a helpful sign is that the mass feels half empty. It usually lies in front of the carotid sheath, but may extend deeply. It may become infected *via* the lymphoid tissue in its wall, and present as an abscess which requires drainage in the first instance with later excision. The age range is 9 - 54. The average age of the 4 patients in the series was 40·5 years, there being 2 of each sex. In one case the cyst was densely adherent to the vagus nerve though no cough was caused thereby as has been reported.

Surgically excision may be very difficult because of deep extension and adhesions to neighbouring structures. This is especially the case if infection has occurred. It is well to remember that many cysts develop layers of fibrous tissue around them by pressure on neighbouring tissues during slow expansion. A plane can be found within this false capsule out of which the cyst may be shelled.

The 4 patients now recorded had no postoperative troubles and 3 are well after periods of 5 or more years.

The patient mentioned above, where the vagus was dissected off the cyst wall, has remained well since 1946. He recently presented with the suggestion of an indefinable softness beneath the scar which may be the herald of recurrence.

Some branchial cysts may therefore present much more intricate surgical problems than fistulae.

First Cleft Anomalies

The ectodermal portion of the first cleft takes part in the formation of the external auditory meatus. The corresponding entodermal portion, or pharyngeal pouch, becomes the tympanic cavity of the middle ear and the Eustachian (auditory) tube. The line of obliteration of the ectodermal portion of the first cleft extends from within the external auditory meatus to just below mid-point of the mandible between it and the hyoid bone. Should the edges of the first cleft unite over it, a skin-lined tunnel will be formed (Fig. 6). It will open on the skin between the mandible and hyoid bones below. The opening is not related to the anterior border of the sternomastoid as usually stated. The track extends up and back, deep to or through the parotid, and superficial to the posterior belly of the digastric muscle and the external carotid (all derivatives of the second arch). The relationship of the track to the facial nerve is uncertain though it is usually described as being superficial.[2] The track stops at or may open into the external auditory canal. These auro-cervical fistulae are very rare. Neel and Pemberton,[3] from the Mayo Clinic, found no first cleft

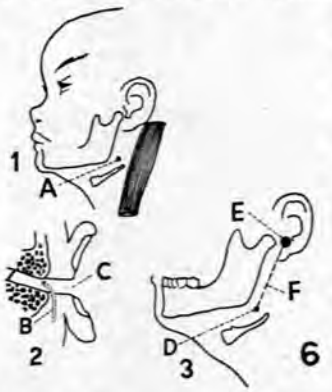


Fig. 6. 1, External opening of first branchial cleft fistula; A=sinus opening on surface. 2, Course of first cleft fistula; B=fistulous track, C=external auditory canal. 3, Coronal section showing termination of first cleft fistula in external auditory canal; D=skin opening, E=external auditory canal showing fistulous opening, F=course of fistula. From 'Synopsis of surgical anatomy' by courtesy of John Wright and Sons, Bristol.

anomalies in 319 cases of branchial maldevelopment. Rankow and Hanford[4] recorded 3 first cleft lesions out of 160 branchial defects at the Columbia Presbyterian Hospital, New York.

Gross[5] reviewed 308 cases of branchial anomalies of which only one involved the first cleft.

Altogether about 13 such fistulae are recorded, 10 of which were in female patients, as were the 2 cases here described.

Clinically these cases behave much as cases of second cleft remnants. There is always an external opening in the submaxillary area between mandible and hyoid bone. There may be a slight discharge in the first few months of life. There may be no discharge for years. Abscess formation occurs if the submandibular opening becomes blocked. There may be a discharge from the ear. The track is lined by squamous epithelium.

Cases have been reported from 1 to 45 years old. The 2 cases reported illustrate variations of behaviour.

Case 1

Miss S.E., referred by Dr. I. Effren of Springs, was first seen in 1948 at the age of 1 year and 11 months. She was born with a 'dimple' in relation to the horn of the hyoid on the right. There had been no discharge. She was referred for consultation because latterly a swelling had occurred beneath the dimple.

On examination a tiny fistula was found. There was a suggestion that a track could be felt running back and up. The track and the dimple were very mobile. A note made at the time stated that this was not a second cleft anomaly, and observation was advised since there had been no discharge or signs of inflammation.

I was undecided as to the genesis of the condition, since auricervical fistulae had not been described up to that time. The child was not seen again for exactly 10 years. In 1958 her parents stated that 2 weeks previously a slight smelly discharge had occurred from the neck opening and from the ear. She was found to have a large swelling beneath the blocked fistulous opening, which was hard and tender. There was no discharge. An otologist reported that the ear was normal. The family doctor was advised to drain the abscess. The parents were told an ablation of the track would be necessary later. Four days after the consultation an opening appeared on the skin near the fistulous one and discharged pus, which also extruded from the external auditory meatus. Dr. Effren was able to pass a probe throughout the length of the track (Fig. 7). Three weeks later the fistulous track was excised.

Fig. 7. A probe throughout the length of a first cleft fistulous track.

Operation (11 November 1958): A ureter catheter was placed through the fistulous track emerging at either end. The face was left exposed so that the anaesthetist could watch for muscle twitching. An incision was made extending from mastoid process, and passing an inch behind the angle of the jaw to protect the ramus colli mandibularis of the facial nerve. It then encircled the sinuses which were mobilized. The track was dissected out, passing deep to the parotid gland and over the posterior belly of the digastric muscle. Attention was given to exact haemostasis, and all tissue to be divided was stimulated by compression with dissecting forceps while the face was observed. No twitching was seen at any time. The track entered the auditory canal at the junction of cartilage with bone and was excised. The facial nerve was not seen. No drains were used. The opening in the auditory canal was not closed. Following the operation there was a complete facial paralysis.

Convalescence was otherwise uneventful.

Electrical reactions, carried out by Drs. Adler and Hoffman soon after the operation, indicated that the prognosis should be good following on a prolonged course of physiotherapy. Some degree of recovery took place slowly.

At this time, 18 months after operation, Dr. Effren tells me that the face is symmetrical in repose, but considerable deformity occurs on laughing.

There is no epiphora and the eye can be almost completely closed.

This is the first recorded case where facial paralysis has followed excision of the fistulous track. The second case behaved differently.

Case 2

S.W., female, aged 1 year and 4 months, was first seen in 1952. She was born with a 'hole' in the left submandibular region just above the great horn of the hyoid. Rarely there extruded a thread of thick yellow material. At the age of 10 months a big abscess formed which was lanced with extrusion of pus. This operation was repeated twice in the ensuing 3 months. The discharge has continued. For the rest the child was well, except for a query in the notes as to whether the mouth was asymmetrical.

On examination there was a large scab in the left submandibular area with a considerable amount of pus beneath it. The case note at the time states that the sinus was not of second branchial origin, but could be related to the first cleft.

Under anaesthesia the pus was released and a probe passed for 1½ inches towards the external auditory canal. No sinus was found in the canal.

The child did not return for excision of the sinus and efforts to trace the family have failed.

This was a first cleft sinus which required excision when infection had subsided.

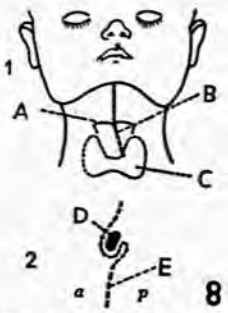
There is now sufficient knowledge of first cleft sinuses or fistulae to recommend their excision since they will at some time give rise to symptoms, such as discharge from the neck or the ear, or abscess formation. The patient or parents should be warned about the possibility of damage to the facial nerve.

THYROGLOSSAL CYSTS AND FISTULAE

Twenty-seven cases of thyroglossal cysts or fistulae were seen from 1942 to 1955. The features and treatment of these conditions are briefly reviewed here. Eleven of these had been operated on for excision of a cyst or fistula previously.

Unlike that of branchial anomalies, the aetiology is well known. From behind the tuberculum impar, the site of the future foramen caecum, at the junction of the anterior two-thirds with the posterior third of the tongue, a solid rod of cells, which later becomes canalized, passes down in the midline between the genioglossi to the upper border of the thyroid cartilage. There it is slightly deflected right or left by the keel of this cartilage. It forms the thyroid gland. The pyramidal lobe is a remnant of the duct. The upper part normally disappears. The development of the body of the hyoid bone results in a deflection of the duct posterior to the bone.

The surgical cure of cysts or fistulae of the duct depends, among other factors, on removal of the central part of the bone, since the remains of the duct cannot be completely removed otherwise because of their close inter-relationship (Fig. 8). As the development indicates, a thyroglossal fistula



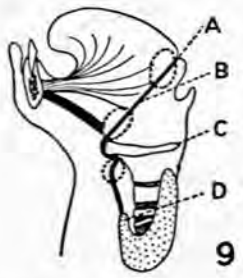


Fig. 8. 1, Course of thyroglossal duct—anterior view; note divergence to left below upper border of thyroid cartilage; A=upper border of thyroid cartilage, B=thyroglossal duct, C=thyroid gland. 2, Lateral view showing relationship between duct and hyoid bone; D=hyoid bone, E=thyroglossal duct, a=anterior, p=posterior. From 'Synopsis of surgical anatomy' by courtesy of John Wright and Sons, Bristol.

Fig. 9. Thyroglossal duct, and sites occupied by thyroglossal cysts; A=foramen caecum, B=thyroglossal duct, C=hyoid bone, D=pyramidal lobe of thyroid gland. From 'Synopsis of surgical anatomy' by courtesy of John Wright and Sons, Bristol.

cannot be congenital in the true sense of the word. Cases reported as such must be due to rupture of a cyst *in utero*. Thyroglossal cysts may be lined by flattened or columnar epithelium. Occasionally thyroid or lymph tissue occurs in the wall. The contents may be clear with cholesterin crystals. Cysts are often infected. Cysts may be suprahyoid or infrahyoid, as the majority are. Most of these cases occurred in relation to the hyoid bone or thyroid cartilage (Fig. 9).

Clinical Features

Thyroglossal cysts may occur for the first time at any age. The ages in this series vary from under 2 years to 60. The average age was 21·8 years. Sex incidence varies. In the 27 cases here reported there were 16 males and 11 females. The length of the history varied from a few weeks to 40 years—the average being 3·1 years. Cysts vary in size and may become as large as an orange. They move with swallowing and some move up on projection of the tongue. Thyroglossal cysts are much more liable to infection than those of branchial origin. Out of 9 operations for cysts, 4 were infected. They burst or are incised, reform, or remain as a sinus. In rare cases carcinoma of the thyroid type may occur.

Treatment is surgical. The operation is performed in a non-inflammatory phase, though there may be pus in the cyst. Incision is transverse and surrounds the fistula. The cyst or fistula is dissected and traced to the hyoid bone. This structure is shaped like an inverted L. The sternohyoid and mylohyoid muscles are freed from the body of the bone, which is pulled forward with a sharp hook, and the central ½ inch is cut loose with bone forceps, the cyst or fistulous track remaining attached. The upper shelf of the hyoid extends farther back than expected, and must be removed. Opinions differ on how to proceed further. The procedure of Sistrunk, whereby a cylinder of tissue is cored out, upwards and backwards, from the hyoid to the foramen caecum (45° angle), is popular. It has not been used here, because the procedure is a difficult and blind one in so far as any upward extension of the remnant is concerned. Once the central part of the hyoid with cyst (fistula) attached is freed from the rest of the bone, the muscle tissue of the geniohyoids and genioglossi is carefully separated from this bone fragment, and an upward extension of the track is looked for. It is as a rule string-like and quite different in appearance to muscle. It is grey or brown. It may widen as it approaches the tongue and be trumpet-shaped.

It is traced up between the genioglossi. The procedure is much facilitated if the anaesthetist puts his finger on the area of the foramen caecum as a guide to the final part of the dissection. It is ligated and cut off at the level of the foramen. One or two stitches approximate the muscles. The gap in the hyoid is not closed. If no upward extension is found, no further dissection is carried out. Drainage is unnecessary. Rarely a nodule which resembles a thyroglossal cyst may be the only thyroid tissue the patient possesses. The surgeon must satisfy himself that the tissue he plans to remove is in reality a cyst. If it is solid, the presence of many supplying blood vessels may give a clue to its nature. A small incision is then made over the thyroid gland itself, and its existence or otherwise is determined. If the upper nodule is the only existing thyroid tissue, it is left *in situ*.

Of the 13 cases operated on in this series, 9 were cysts and 4 sinuses. Four of these were recurrences following previous operations elsewhere. In all cases the central part of the hyoid bone was removed, and in 7 a remnant of the thyroglossal track was traced to the tongue. This is a higher percentage than reported by others.

In one case the upper end of the track reached the vallecula and not the foramen caecum. In another the track divided and 2 string-like bands were traced to the tongue.

There were no postoperative complications. The patients were treated at periods from 5 to 17 years ago. There have been no recurrences.

RÉSUMÉ

The series comprises 48 patients with branchial or thyroglossal anomalies seen in private practice. Eleven had had previous operations designed to cure the conditions. Of the total, 30, comprising 33 operations, elected surgery. Operations were performed for 4 pre-auricular fistulae, one fistula of the first cleft, 11 fistulae of the second cleft, 4 cysts of the second or lower clefts, and 13 thyroglossal cysts or fistulae.

RESULTS

Two pre-auricular fistulae were cured and two were not cured. The first cleft fistula was cured, but the patient was left with a partial facial paralysis.

The 11 second cleft fistulae were cured.

One branchial cyst shows signs (8 years after operation) of what may be a recurrence.

None of the thyroglossal cysts or fistulae have recurred within 5 to 17 years after operation.

DISCUSSION

Comparison of branchial with thyroglossal remnants dealt with in this series discloses the following:

Aetiology. Not settled regarding branchial anomalies, whereas the origin of thyroglossal anomalies is known.

Situation. Branchial—lateral, thyroglossal—medial.

Presentation. Primary fistulae include most branchial cases. Thyroglossal fistulae are secondary. Branchial fistulae

are present at birth. Thyroglossal fistulae cannot be (developmentally) congenital. Branchial cysts occur at a variable time after birth. Thyroglossal cysts may exist at birth or appear at any age.

Multiplicity. Branchial fistulae are bilateral in 30% of cases or more. Thyroglossal anomalies are always single.

Previous operations. None in branchial anomalies, common in thyroglossal operations.

Totality. Branchial fistulae are complete but for rare exceptions. Thyroglossal remnants stop at the hyoid bone in most cases.

Relationship to important vessels and nerves. Intimate in branchial anomalies, non-existent in thyroglossal anomalies.

Nature of operation. Entirely satisfactory in branchial fistulae. Less satisfactory in thyroglossal fistulae.

Malignancy. In branchial cysts rare and doubtful; in thyroglossal remnants exceedingly rare.

SUMMARY

1. Branchial and thyroglossal cysts and fistulae are curable conditions providing the surgeon is familiar with their developmental anatomy.

2. Auro-cervical or first cleft fistula is an established entity.

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